clarifying the end of the connector. It is believed that claim 5 as amended meets the requirements of 35 U.S.C. § 112.

The next issue raised in the official action was the rejection of claim 1 on Petriekis, et al. 6,200,300 under U.S.C. § 102(e). The Examiner specifically cited spout 24 with two ends with a flange portion 56 thereon and col. 4, lines 30-45. In response to this rejection, claim 1, has been amended to patentably distinguish applicant's invention over Petriekis, et al. Specifically, the claim now requires the flange be located on the connector at a location which is intermediate the ends of the connector. The flange in Petriekis, et al. is located at the end of the spout consistent with its function as a spout, as set forth in greater detail below.

The next issue raised in the official action was the rejection of claims 3-4 under 35 U.S.C. § 103(a) on Petriekis, et al. In response to this rejection, claim 1 has been amended as described above to patentably distinguish over Petriekis, et al; accordingly, claims 3-4 which depend from claim 1 as amended, should be allowable as well.

The next issue raised in the official action was the rejection of claims 2 and 7-12 under 35 U.S.C. § 103(a) on Petriekis, et al. and Niedospial, et al. The Examiner cites 210 in Niedospial, et al. as an over wrap. In response to this rejection, claim 7 has been amended to require the intermediate flange and a bag connected thereto. Claims 8-9 have been cancelled.

The next issue raised in the official action was the rejection of claims 5-6 under 35 U.S.C. § 103(a) on Petriekis, et al. and Poitras. It is not seen how the container 50 (a can) is pertinent to the structure covered by claims 5-6.

A brief review of applicant's invention may be helpful. Large pre-sterile plastic fluid storage bags, sometimes referred to as "BioProcess Bags or BioProcess Containers", are gaining increasing usage for storage of sterile solutions in the pharmaceutical and biotechnology industry. Pre-sterile Bioprocess Bags have advantages over rigid glass or metal tanks in terms of cleaning, storage, capital outlay, and preparation time. These bags are delivered to the pharmaceutical manufacturer pre-sterilized, pre-configured with tubing and hose fittings, used once, and discarded. The subject of this invention is that of an innovative hose fitting intended for use as a connector attached to the inlet and/or outlet tubing of the Bioprocess Bag.

Small storage medical type fluid bags have been used in the medical device industry for fifty years or more. These types of bags are on the order of 1 liter or less and serve primarily to store and/or administer therapeutic drugs, saline solution, blood, plasma, or perhaps as a feed container for parenteral nutritional infusion. It is only within the past several years that large bags, from 1 liter volume to over 1000 liters, have made their way onto the production floor of pharmaceutical and biotechnology drug manufacturers. It is certainly easy to envision these much larger bags as "overgrown cousins" to the smaller medical fluid bags. Indeed much of the core technology used to manufacture the larger bag draws on knowledge from the production techniques, materials, and components used to make smaller bags. Due to the sheer size of the large bag, a rigid bucket is required to

provide support and handle the weight of the fluid. The bag film itself serves largely as a barrier for sterility and is not relied on for structural integrity. Hence a bag that holds 500 liters is designed to fit comfortably in and acquire the dimensional shape of a known bucket capable of holding 500 liters.

In order for any small or large sterile process bag to be useful, it must be designed and constructed with a means to move fluid into and out of the bag. This is generally accomplished by sealing a fitment to the bag film (Petriekis describes a design in U.S. Patent 6,200,300). The fitment can be a fluid entry port of some type, such as a septum, spike port, or injection site - as is most common with small bags. On larger bags, the fitment is generally a hose barb port intended for a fluid conduit (i.e. flexible tubing). The latter being a requirement of large bags, since it is impractical to lift/maneuver a filled large bag in the way one can manipulate/hang a small medical fluid bag. The end of the flexible tube on the large bag will have a connector or hose fitting of a specified type intended to co join the large bag with the desired equipment in the process for which the fluid inside the bag is intended. The flexible tubing conduit is required to allow the operator to move the connector remotely to the desired location while the large heavy filled bag remains stationary. The conduit and connector must be appropriately sized for the process such that it will provide a satisfactory flow rate to the process equipment. Finally, the connector itself needs to provide a closure for the system such that sterility is maintained while the fluid is being stored in the large bag. It is also essential that the connector, or fitting, minimize contamination risk when it is handled for the purpose of making a connection.

In order to meet the above requirements, it is easy to specify an appropriately sized conduit, typically a large diameter flexible tube or hose. However, the available connectors used in existing art fall short of meeting the requirements as outlined above. Often times, connectors utilized from the variety found in the medical device industry for small bags are force-fit to work on large BioProcess Bags with often disastrous results. The smaller connectors, while suitable for intravenous medical applications, simply do not provide adequate flow rate. Further, the types of connector fitments in the medical device industry (e.g. needles, luers and plastic tubes intended for solvent welding, etc) do not find their opposing mate on the production equipment used by the pharmaceutical industry. Inlet ports on large scale pharmaceutical equipment are designed with large diameter sanitary flange connectors, not miniature luer fittings.

Because of the shortcomings mentioned with the variety of medical device type connectors above, the manufacturers of the large BioProcess bags utilize larger connectors on the end of the flexible tubing. These hose fittings are readily available with the appropriate sanitary flange styles. However, all of these types of connectors are open-mouthed, exposing the inside of the flexible tubing and also the fluid contents of the bag. It is therefore current common practice in the industry to cover the connector fitment with a plastic polybag, or other type of non-woven material such as autoclave dressing. The material is then secured to the flexible tubing with adhesive tape or a rubber band. Used in this way, these materials serve merely as dust covers and require additional assembly on the part of the bag manufacturer. Some connector fitments, such as the sanitary flange connectors, permit attachment of a solid rigid end cap and gasket that can be secured with

a locking clamp. These parts are expensive, and cumbersome to install. The cap, clamp, and gasket format will provide a seal to the bag system; however, areas immediately adjacent to the cap-clamp closure are not protected. This area is critical, as it the boundary area to the sterile fluid path of the bag system. When a production operator is required to remove the cap-clamp closure in order to make a connection to some other piece of equipment, there is virtually no way in which the operator can do this without contaminating the areas immediately adjacent to the fluid path.

The current invention solves the problem of size, style, and closure. The invention provides a hose fitting with a sanitary style flange of suitable size for bioprocess bags that is enveloped in a protective plastic over wrap that has been hermetically sealed to the part itself. This over-wrap insures integrity of the container is maintained and provides a film surface for which the operator can manipulate the part without having to directly touch it.

In use, the connector(s) of the invention will be attached to a large fluid holding bag via a piece of tubing. The large bag, equipped with a connector(s) is then packaged, in its entirety, within one or two large polyethylene pouches and subsequently sterilized via, for example, gamma-irradiation sterilization or by exposure to steam in an autoclave (two outer poly-pouches are often used in pharmaceutical clean-room applications). In use, a biotechnology or pharmaceutical fluid processing technician will use the connector(s) on the bag to fill the large sterile fluid holding bag with a process solution. This is achieved by removing the overwrap enclosure that protects the end connection of the invention (in this case on the inlet of the bag) under a sterile field and connecting it to the equipment that will feed sterile solution into the bag. When the bag is filled, the tubing is clamped off

or heat-sealed closed. A second connection on the bag serves as an outlet. The overwrap enclosure maintains the sterility of the outlet end connector until the processing technician needs to access it. This is true even if the bag is moved through, or stored in, non-sterile environments. When required, the overwrap enclosure is removed under a sterile field for connection to the next piece of tubing and/or equipment in the process. In situations where absolute sterility of the end-connection is not required, the overwrap enclosure can be used outside of a sterile field with the knowledge that the overwrap enclosure has kept the end-connection sterile until the moment the enclosure is removed, thus minimizing unnecessary additional bioburden. Another benefit derived from the invention involves the ability to manipulate the connector after opening the overwrap while gripping directly only the outside of the overwrap enclosure and not the connector itself (the inside surface of the overwrap enclosure is sterile, along with the connector itself). This permits an operator to maneuver and position the end connection without directly touching it, a major advantage.

There is no invention in the existing art that describes a connector capable solving the problems as indicated above for the large sterile bag systems. There are instances of prior art showing medical device bags intended to hold and store fluids. These examples are for medical fluid containers, not connectors. The current invention is a new and novel combination unbudgeted by the prior art examples. Petriekis describes a design in U.S. Patent 6,200,300 for small bags capable of being lifted onto a hanger. This patent shows a device with a common attribute to the current invention, the weld flange 56, used in an unrelated fashion to the current invention. The spout 24 described in the Petriekis patent

is intended to serve only as the inlet/outlet port of a small bag 10. The small bag 10 serves as the primary fluid container. If the spout 24 and bag 10 by Petriekis were intended, in some way, to be used as a connector - instead of a primary fluid container, which is neither obvious nor intended, there would need to be multiple changes to the design. First, Petriekis does not show a fitment or connector internal to the bag. This fitment cannot exist in the Petriekis invention because the bag is designed to hold fluid and intended to collapse fully when drained. Second, the weld flange must be repositioned to the center of the fitment, not flush to the end. Finally, the bag, flange and internal fitment must be of a size and shape such that the bag can be welded to the fitment along a folded perimeter of the bag and not on one of the frontal sides of the bag. If the internal fitment of the current invention is sealed such that it is perpendicular to the frontal face of the bag (as in the Petriekis invention), then a "tee-pee" effect will occur, stressing the film and preventing the bag and fitment from laying down flat together. A curved sealing flange works best when welding on the folded perimeter of the bag to achieve a lay-flat posture and minimize space.

Poitras in U.S. patent 3,006,341 describes a Medical Fluid Handling and Administrating Apparatus that shows an extension of intravenous tubing 13 "seized over a phlebotomy needle". The needle is then covered with "sealing sheath 16, the outer end of which has been flattened and fused about the tip of the cannula, thereby effecting desired sterile, hermetic sealing of the tip...". This device would be completely unusable for anything other than the small volumes and low flow rates encountered when working with individual units of human blood, for which it is intended. The sealing of the sheath occurs

at the end of the needle and on the needle, which would render the current invention useless in large-scale bioprocess applications. This configuration bears little resemblance to the current invention and could not address the problems discussed.

Porat in U.S. Patent 5.008,994 shows a medical drip-feed bag 1, intended to store fluids not serve as a connector. This device could not in any way be used as a connector system for a larger BioProcess Bag. The invention shows a sealable inlet 5, and outlet 6, sandwiched between the film edges intended to keep the bag flat. This method could not accommodate the weld-flange method of the present invention, which is performed on the folded edge of the bag. Nor does the Porat invention provide a means for connecting tubing or hose inside the bag.

Niedospial, Jr. in 6,039,718 teaches a "Multiple Use Universal Connector" for fluid bags as an integral part of the bag with a re-enterable, self sealing diaphragm so that a pharmaceutical fluid contained in the container can be repeatedly accessed. This invention is designed to be an integral part of the fluid container and contains a diaphragm for use with a needle, cannula or Luer type syringe. There is no provision for tubing connections on the inside of the fluid chamber as it is not a desired feature or intention of the Niedospial invention. This makes it unsuitable to solve the problems described as a hose connector for BioProcess Containers.

Smith et al. in 6,183,460 shows a multi-use solution bag with ports 34 and 34a

The references cited but not relied on are similarly deficient. Butler in 2,838,046 shows another medical fluid bag, similar to Porat, with a weld and fitment along the folded

edge 32. The fitment however, contains an internal frangible diaphragm 41, a plug 43, and a metal cap 48. These features, as well as the small size and intent of the product as a fluid storage device, make it impossible to use as a connector described in the present invention. The following are prior art examples of other fluid pouches and devices showing plastic bags attached to connectors; Christine, 5,391,163 shows a medical hanging fluid dispensing pouch with a fluid reservoir section 12, and coupler section 14, located within a second sterile section.

The Examiner's remarks in paragraph 10 of the Official Action regarding the location of the intermediate flange are respectfully traversed. The location of the flange distinguish between the fluid ports of the prior art and the large bag connector of the present invention.

Reconsideration and favorable action is respectfully requested.

Respectfully submitted,

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2003

CERTIFICATE OF MAILING

I certify that all of these documents are being deposited with the United States Postal Service on _____, 2003 in an envelope addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.

Dated: _____

ROBERT M. SKOLNIK

VERSION WITH MARKINGS TO SHOW CHANGES MADE

Amend Claims 1, 5, 7, and 10-12 as follows:

1. (Amended) A connector assembly for containers used in sterile operations comprising: a connector having two ends and a flange formed thereon at a location which is intermediate said two ends; and an over-wrap bag enclosing one of said ends, said over-wrap bag being attached to said flange for maintaining sterility of said enclosed end.

5. (Amended) The connector assembly of claim 1 wherein the [other] end of said connector which is not enclosed is attached to a large fluid-processing bag.

7. (Amended) A sterile connector assembly comprising: a connector having two ends; a flange formed on said connector intermediate said two ends; a sealing bag attached to said flange enclosing one end of said connector; and a second bag enclosing the said connector and said sealing bag for double sealing said end of said connector enclosed by said sealing bag, whereby said second bag is open in a sterile field so that the exposed end of the connector may be attached to sterile tubing said other end of said connector remaining sealed in said sealing bag to maintain its sterility.

10. (Amended) The sterile connector assembly of claim 7 [8] wherein said flange is curved.

11. (Amended) The sterile connector assembly of claim 7 [8] wherein said flange is flat.

12. (Amended) The sterile connector assembly of claim 7 [9] wherein said sealing bag is attached to said flange by a heat seal.

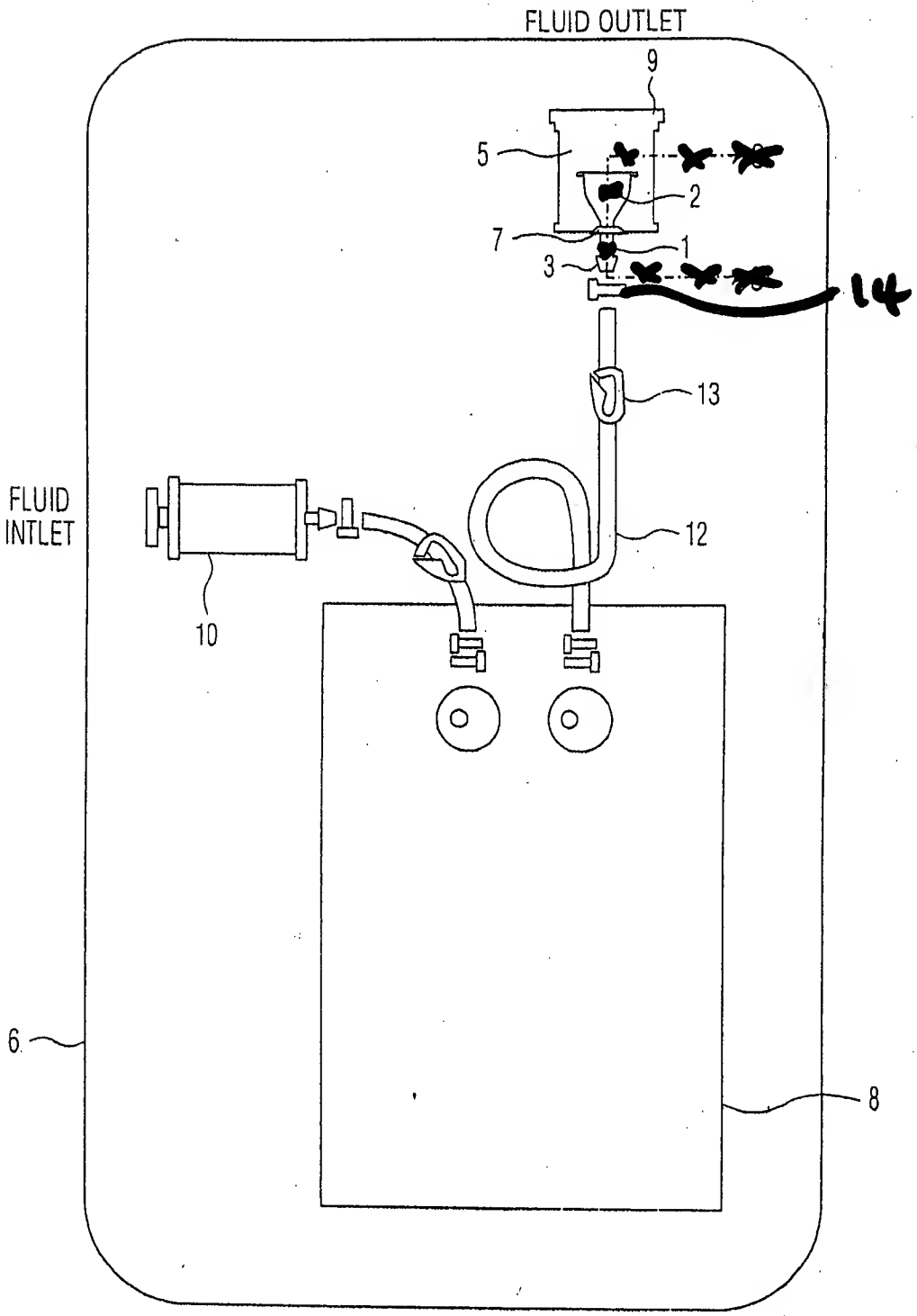

FIG. 5